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## Top 10 Innovative Projects

*By T&L Editors*

In past Top 10 issues, we've profiled emerging technologies and smart technologies. This year we take a look at how these technologies are being applied to implement new and more innovative approaches to learning. It's "technology in action", if you will. Choosing 10 top projects from the hundreds, thousands, and probably millions out there is, of course, nearly impossible. In the end, *T&L* editors settled on a mix: some are high-end and cutting edge, others are more accessible to novice technology users, and still others are old favorites that have evolved over the years. Despite the somewhat eclectic selection you'll find here, common elements include authenticity, collaboration, the use of critical thinking skills, global implications, in-depth investigations, and a very high student motivation and engagement factor. All in all, we hope you'll find the following projects compelling, worthy of emulation, and exciting examples of ways 21st century technologies are reinventing the concept of "school." -Susan McLester

### 1 — Wartime Documentary: Japanese Americans

**Combining historical footage and contemporary interviews, four middle school students used digital video to document the Japanese American experience during World War II.**

*By Hall Davidson*

There are 52 living Congressional Medal of Honor recipients from World War II. Four middle school boys, armed with camcorders, computers, and a mission for a History Day project, tracked down five of those medal recipients to tell their story.

The project began when the student team of Lester Pak, Joe Chen, Henry Priess, and Matthew Streshinsky realized that many people had never heard of the 442nd Regimental Combat Team, a segregated Japanese American military unit that became, man for man, the most highly decorated unit in U.S. history. The students chose video as their medium to tell the story of the "Gaman Warriors" ("gaman" means "intestinal fortitude") because they felt it would be the most powerful way to showcase their primary source interviews.

The medal recipients interviewed by the students were all of Japanese American ancestry, and all came from families in internment camps. The students also interviewed draft resisters from the camps, who exhibited a different kind of courage in their fight for the rights of Americans behind domestic barbed wire.

Under the guidance of teacher Maridean Mieres, the students researched over the course of an entire school year, using the Internet to find primary sources and pulling material from video and photo archives. They taped the interviews, then used Dazzle Digital Video Creator, MGI Videowave 4, and iMovie to combine the historical footage with their own material.

The video begins by documenting the United States entry into World War II and the internment of Japanese American citizens. Following are the students' interviews with leaders of the resistance movement and with the medal recipients. The final piece

reveals the work of Japanese Americans in MIS intelligence units, who used their knowledge of Japanese to gather military intelligence.

In the case of "The Gaman Warriors," digital video technology brought students and primary sources together to create a documentary of events that might otherwise have been forgotten. "We learned how fragile our constitutional rights could be," the students said, "and we believe that it is everyone's responsibility to protect those rights. We hope America will not make this mistake again, for 'American' includes Americans of all ancestries."

### Link Up

"The Gaman Warriors: The Japanese American Responsibility During World War II," as well as lessons in student video making: <http://www.schoolhousevideo.org/>

## 2 — Virtual Marine Biology

**Using a new technology for videoconferencing over the Internet, students are helping a local aquarium conduct marine research.**

By Mike Brown

Last year, a handful of lucky students at Briarcliff Manor school district in New York collaborated with marine experts at the Maritime Aquarium at Norwalk, Conn., to study seals and other marine life in nearby Long Island Sound. The Seals on Camera project began with students accompanying a seal expert to visit seal habitats off Sheffield Island. There, they collected authentic data on the number of seals on rocks, wind speed, and cloud cover.

After returning to the classroom, students continued the study using Wave Three's Session software, which allows videoconferencing over any Internet-enabled computer. The aquarium provided live streaming video of seals in their natural habitat so students could observe and make conjectures about seal behavior. With remote guidance from experts at the aquarium, students dissected squid to learn about the form and function of marine invertebrates, and examined seal scat to look for evidence of the seals' diet. From their classroom, they were able to observe the aquarium staff dissect a shark, which allowed them to evaluate the differences between shark and human anatomy.

The aquarium also loaned the school a large number of live animals, such as sea stars, for students to study up close and discuss in collaborative sessions. In each case, a marine biology expert was present via videoconference to provide direction for the students. The program culminated in a symposium at the school where parents, aquarium specialists, and other educators gathered to hear students present what they had learned.

Briarcliff Manor instructor Mary Yulo was amazed at the level of student excitement as they participated in each segment of the project. "Middle school athletes gave up practices and games to attend the video collaborative sessions," she said, "and students who were hesitant to speak in front of groups willingly presented feedback during the concluding symposium."

### Link Up

Briarcliff Manor Union Free School District: <http://www.briarcliffschools.org/>

The Maritime Aquarium at Norwalk: <http://www.maritimeaquarium.org/>

Wave Three Software: <http://www.wave3software.com/>

## 3 — ThinkQuest

**Seven years old and still evolving, the international ThinkQuest project continues to encourage students to conduct motivating, in-depth investigations.**

By David Warlick

ThinkQuest is not new. In fact, students have been participating in the project since 1996, shortly after the advent of the World Wide Web. However, ThinkQuest still remains a clear example of how the Internet can empower students with activities that foster deep learning and communication skills across a variety of subject areas, in any language or region around the globe.

On the surface, ThinkQuest is a contest, where teams of students create Web sites to compete for prizes and an opportunity to travel to San Francisco for the annual ThinkQuest Live event at OracleWorld.

At its heart, however, ThinkQuest asks students to work collaboratively, in teams of three to six members, to create an educational Web site for other students. Teams conduct in-depth research and become experts in their chosen topic. They gather and organize their findings and devise a plan for using the unique qualities of the Internet to help other students learn about the topic. Finally, the team constructs a Web site that is published on the ThinkQuest server and made available to students around the world.

The ThinkQuest Library already houses more than 5,000 student-constructed educational Web sites and includes links to additional international libraries from ThinkQuest programs in Africa, Argentina, Denmark, Italy, Japan, Netherlands, Singapore, Sweden, and Switzerland.

International collaboration is an important aspect of the ThinkQuest experience, and students can earn extra points for making their site available in more than one language (one of the languages must be English or Spanish).

One of the new features of ThinkQuest is peer evaluation, with final evaluation conducted by an international panel of judges.

Artificial intelligence, Shakespeare, the brain, and elementary number theory are among the hundreds of topics covered in student-created sites available online now. New topics for this year's competition include natural disasters, mythology and folklore, space travel, global economy, medicine and more.

**Link Up**

ThinkQuest and Library links: <http://www.thinkquest.org/>

Past winners of ThinkQuest USA: [www.thinkquest.org/library/winners.html](http://www.thinkquest.org/library/winners.html)

**4 — The Education Arcade****Learning simulations come of age with 3-D gaming technology.**

By Eric Klopfer, Kurt Squire, and Philip Tan

Crash Bandicoot, The Master Chief, and Pikachu are all names that may sound foreign to you, unless you are one of the millions of Americans who play computer and video games. A generation of game players has grown up, and games have grown up with them, pushing the boundaries of technological innovation and generating billions of dollars in revenue.

Over the past two years, researchers at MIT and University of Wisconsin at Madison have been examining how games can support learning. The Education Arcade was created to explore the potential for computer and video games to engage students in

subject areas as diverse as physics, environmental engineering, and Shakespeare.

In *Supercharged*, a 3-D electromagnetism simulation game, players navigate a ship through electromagnetic mazes, using their knowledge of physics to solve challenges that reinforce their understanding of magnetic fields, lines of charge, the behavior of charged particles, and other difficult concepts. Unlike traditional "school," where the motivation to learn is often to pass a test, *Supercharged* motivates students by using the latest gaming technology to help them achieve their goals.

Recently, *Supercharged* was integrated into a Waltham, Mass., middle school science curriculum, where students using it outperformed their counterparts in traditional classrooms (who'd learned through hands-on activities, lectures, and videos) by 20 percent on a final test of main concepts.

The research is just beginning to unlock the educational potential of games. The next step involves creating new games, as well as developing curriculum to help teachers use existing games.

### Link Up

The Education Arcade: <http://www.educationarcade.org/>

## 5 — Life on the Streets

**What does it mean to be homeless? A Web competition gave teenagers who live it every day an opportunity to learn, communicate, and inspire.**

By Gwen Solomon

This past summer, five youngsters who knew a lot about being homeless, but very little about making Web sites, created a site to help others understand the realities of homelessness. The result is *Life on the Streets*, an online project which provides an inside look at the issues of homelessness by young people who know them firsthand.

Besides presenting personal definitions and stories of homelessness, the site shows that San Diego isn't all sunshine and beaches, but is also a place where people go hungry and struggle to survive. The centerpiece is the photo gallery, San Diego's Hidden Face. Students photographed street scenes and added touches of humor and irony. For example, they labeled a photo of a bike pulling a cart of someone's possessions as "a homeless Cadillac."

The students wrote about the project, "We think our Web site will make a positive impact on our community, as well as the rest of the world, by helping others understand that many people, especially kids, become homeless through no fault of their own." The site has attracted media attention in San Diego and worldwide, including an invitation to be featured on *The NewsHour with Jim Lehrer* on PBS.

While students were at different academic and technical skill levels, their goal of creating the site motivated them to pool their resources. In addition to learning about Web design, Microsoft FrontPage, and copyright issues, they discovered the power of the Internet for research and communication.

The project has also fueled their artistic and academic ambitions: this year, they plan to shoot a documentary to include on the site.

### Link Up

Life on the Streets site:  
[www.globalschoolnet.org/programs/lifeonthestreets/index.htm](http://www.globalschoolnet.org/programs/lifeonthestreets/index.htm)

## 6 — Road Rules

**The Dell-Winston Solar Challenge is more than a race-it's an all-around "brain sport" for teachers and students.**

By Amy Poftak

Seventeen-year-old Chelsey Johnson is zipping down a Texas highway at 35 miles per hour, on the first leg of a 1,000-mile race to Cocoa, Fla. Ahead of him, a lead car scouts out the driving conditions. Trailing is a chase van, where a team of students, armed with laptops, crunch speed and battery life numbers, sending him directives via CB radio.

This is not a video game; it's the Dell-Winston Solar Challenge, a program that teaches high school students to engineer cars powered by the sun. Founded in 1991 by the private Winston School in Dallas, Texas, the first challenge attracted 90 schools, with three cars qualifying for the final race. Today, 900 schools from 22 countries are involved.

Preparation starts with a workshop in July, where new student teams and their teachers get a dose of best practices, fund-raising ideas, and technical expertise. Kids plot their vehicle designs in the fall, and by springtime, teams must pass rigorous prequalifying tests (aptly called "scrutineering").

In addition to learning about engineering, alternative energy, battery technology, aerodynamics, computer science, and meteorology, kids have to translate that knowledge into strategy: What speed does the driver need to go to maximize battery power? What's the best window for sun collection if partly cloudy skies are predicted? Because the race passes through diverse communities, it also provides students with cross-cultural opportunities, from a night of folkloric dancing in Juarez, Mexico, to a dinner at an Apache reservation.

Although largely subsidized by Dell, the Winston School, and other organizations, the program is not inexpensive, with car components alone costing \$10,000-\$12,000. Organized and sustained fund-raising is essential. For Winston faculty member Lehman Marks, however, the benefits outweigh the costs. "This is one of the best things I've ever found to affect kids' lives," he says.

### **Link Up**

Dell-Winston Solar Challenge official site: [www.winstonsolar.org/race](http://www.winstonsolar.org/race)

How to build a solar car: [www.winstonsolar.org/info](http://www.winstonsolar.org/info)

## **7 — Keeping the Peace**

**What the world needs now: a grassroots publishing venture that brings together the voices of children from many nations.**

By Jeffrey Branzburg

On January 1st, many Haitians mark the New Year and the anniversary of their independence by eating pumpkin soup. Third-grader Riva P. contributed a recipe for this traditional soup, along with a 300-word essay about how it relates to Haitian history, for the publication "Peace Diaries Volume II: Cultivating Peace."

Launched in January 2002 by nonprofit Knowledge iTrust-in direct response to events of September 11th-Peace Diaries is an international education program for students like Riva P. to "learn, share, and collaborate on projects that produce educational content and global dialogue." To date, 1,500 students from 15 countries, including Azerbaijan, Israel, and France have participated in the program's activities, which have yielded a Web site and two print books.

Although the activities change from year to year, all seek to have young people reflect on the richness and complexity of their various communities. In "Recipes of

Life," students wrote about and illustrated favorite food dishes related to family history.

Peace Diaries plans to continue publishing all work online, but may sponsor a writing and art contest to narrow down selections for the printed book. A radio production component for the program is also in the works.

### Link Up

Peace Diaries official site: <http://www.peacediaries.org/>

Other cross-cultural projects: International Education and Resource Network (<http://www.iearn.org/>); The Bridge Project ([thebridgeproject.org](http://thebridgeproject.org))

## 8 — Building 3-D Worlds

### Three-dimensional modeling offers an open-ended tool for visualization and exploration.

By Michelle Thatcher

Imagine a high school student researching and building a scale model of the Parthenon for history class-then climbing the steps and entering it, only to find himself in total darkness. His immediate question: how did the ancient Greeks light this space? The student returns to his research, digging deeper to find the answers.

This is the type of extended inquiry that 3-D modeling engenders in the classroom, and it's one of many projects that students of art teacher Donald Wass have tackled by creating virtual models of real environments. Since 1986, Wass's students have used such software as LightWave, Maya, and more recently, Adobe Atmosphere-a new tool for authoring immersive virtual environments-on a number of cross-curricular projects.

For example, past classes have used LightWave to construct a virtual tour of a local historical village, the Colebrook Iron Forge, based on a drawing of the site layout from the 1700s. Building the model required not only scaling measurements from paper to three dimensions, but also researching local history and construction techniques. This year, students are revisiting the project, using the Adobe product to explore and interact with the virtual environment.

Students in have also constructed a model of a French chateau and a scale model of the school's stage. But for Wass, the triumph of 3-D modeling as an instructional tool came when one of his art students produced a model of a carbon molecule. His classmates, who were struggling to visualize the molecule, were able to virtually walk around it and examine its chemical structure.

That type of cross-curricular application, Wass says, illustrates the usefulness of 3-D modeling programs beyond art class. Indeed, Wass expects that few if any of his students will become professional animators. What he does see, however, are "kids developing the ability to think and conceptualize in a 3-D world."

### Link Up

Wass's student project gallery (download Atmosphere Player from the Adobe site to view projects): [tinyurl.com/d1c3](http://tinyurl.com/d1c3)

3-D animation products: LightWave (<http://www.newtek.com/>); Maya (<http://www.alias.com/>); Atmosphere ([www.adobe.com/products/atmosphere](http://www.adobe.com/products/atmosphere))

## 9 Virtual Skies

### Authenticity is the key to motivating students through the challenging world

**of the air traffic controller.**

By Charles Parham

NASA, in its new Virtual Skies Web site ([virtualskies.arc.nasa.gov](http://virtualskies.arc.nasa.gov)), invites teachers and students to explore the world of air traffic management. Air traffic management? What about space ships and Mars probes? It takes a few minutes to step back and connect with the true challenges of this task. Air traffic management is an occupation where a few individuals are in control of a large group of planes that they must direct to land and take off safely. Air traffic controllers have to be virtual pilots and understand the physics of flight, radio communication, navigation techniques, and weather, and think of passenger safety.

Virtual Skies is designed for teachers and students in grades 9-12. It provides an online tutorial and simulation for students and extensive support material for teachers. At first glance, this Web site might seem pretty daunting; it is packed with information and there is a lot of text in the tutorials. Each section has online activities on the special language of the air traffic controllers radar screen, sorting out incoming flights into an orderly landing sequence, reading weather maps in order to make alterations in plans, and other basic principles of flight used to determine whether or not a plane can perform certain tasks.

There's a lot to learn, and some of the material is pretty technical, which makes for an authentic experience. NASA made a good decision when they decided not to dumb down the content to make it easily accessible to anyone who entered the site. Dealing with the "real stuff" is both messy and rewarding.

**Link Up**

First Flight: The Wright Brothers: [firstflight.open.ac.uk](http://firstflight.open.ac.uk)

The Federal Aviation Administration: [www2.faa.gov/education/wright/wright.htm](http://www2.faa.gov/education/wright/wright.htm)

**10 — Andes Adventure**

**"Day after day they came out of their tents, no matter how hard it was blowing or what was coming out of the sky, strapped crampons on and tied onto a rope..."**

*-adult expedition advisor noting the remarkable dedication of the high school girls studying glacial recession high atop Ecuador's Nevado Cayambe mountain*

By Susan McLester

The photos from base camp show blinding sun rays shooting through craggy peaks against a cobalt, high altitude sky. They show summer-color tents in orange, white, and blue, flattened by high winds and strewn across the pebbly brown moonscape of Nevado Cayambe's above-tree line terrain. Other photos record girls in parkas and heavy woolen caps setting up a portable weather station amid swirling snow and low, dark skies, mapping a narrow, rocky mountain stream, and drilling into glacial ice to fix ablation stakes in order to measure the mass's movement over time.

**Welcome to class.**

This is the International Non-Traditional Teaching Initiative 2003 Expedition, an experiential education component of the college prep curriculum at the all-girl Oldfields School in Maryland. The nine girls, who made the trip with 11 adult advisors, were on Nevado Cayambe to live and breathe real science at 19,000 feet. Their mission was to study glacial recession and climate change in the Tropics, and to look at possible effects Nevado Cayambe has on the local ecosystems and people. In a larger context, the students' findings will contribute to a worldwide body of research on global warming.



In addition to such traditional tools as ropes and ice picks, the team was equipped with an array of portable wireless devices, including laptops, iPaks, printers from Hewlett-Packard, a differential GPS unit from Leica Geosystems, and a HOBO weather station and data loggers from iScienceProject, a program sponsored by Onset Computer Corporation. These electronic tools were put to use in a variety of data collection activities. The girls deployed the weather station to collect baseline meteorological information on the stability of the mountain's climate-which can be an indicator of global climate fluctuations-and were able to produce color printouts on the spot. They also used the handhelds with sensors to measure temperature, wind, and other elements, and could analyze information instantly back at base camp by downloading it to laptops with graphing software. Students also mapped the glacial margin, to document the exact location, the snow line, and the precise depth of the glacial ice to record changes over time.

And lest anyone suffer under the notion that outdoor adventures are all fun, expedition leader Ret Talbot is quick to point out that Mother Nature's challenges-like sustained high winds and trek-impeding crevasses-kept the journey "exceedingly real."

### Link Up

For more on the expedition: [www.oldfieldsschool.org/INTI/inti2003.html](http://www.oldfieldsschool.org/INTI/inti2003.html)

Global classroom projects: [www.sofweb.vic.edu.au/enviro/ssm/gcp.htm](http://www.sofweb.vic.edu.au/enviro/ssm/gcp.htm)

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